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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/782,240

02/13/2001

Elena A. Fedorovskaya

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1333 7590 08/11/2004

PATENT LEGAL STAFF
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EXAMINER

LAROSE, COLIN M

ART UNIT

PAPER NUMBER

2623

DATE MAILED: 08/11/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/782,240

Applicant(s)

FEDOROVSKAYA ET AL.

Examiner

Colin M. LaRose

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-11, 13-18, 20-25, 27 and 28 is/are rejected.
- 7) ☒ Claim(s) 5, 12, 19 and 26 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>2</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 8, 13, and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,642,433 by Lee et al. (“Lee”).

Regarding claim 8, Lee discloses a method (figure 3) of determining overall lightness contrast of an image comprising:

1) extracting pixel values from said image (column 3, lines 66+: the central computer digitizes the microscope image to extract pixel values);

2) calculating an image edge contrast based on said pixel values (16, figure 3: the “edges of edges” computation is a measure of contrast at the edges);

3) calculating area contrast based on said pixel values (12, figure 3: morphological operations are used to calculate the contrast (“edge intensity”) of the entire image area, as represented by the edge gradient); and

B) calculating said overall lightness contrast of said image by combining: said edge contrast, said area contrast and (column 5, line 61 through column 6, line 7: the image contrast score is defined as the ratio of the accumulated edges of edges intensity (“image edge contrast”) and the accumulated edge intensity (“area contrast”).

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Regarding claim 13, Lee teaches that the overall contrast is a linear combination of the image edge contrast and area contrast (column 6, lines 1-6: the contrast is calculated as a linear ratio of the edge contrast (“edges of edges intensity”) and the area contrast (“edge intensity”).

Regarding claim 14, Lee teaches that the overall contrast is a weighted combination of the image edge contrast and area contrast (column 6, lines 1-6: the contrast is calculated as a the edge contrast (“edges of edges intensity”) divided by the area contrast (“edge intensity”), so that the contrast measure is essentially the edge contrast weighted by the area contrast).

3. Claims 8, 13, and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 3,737,855 by Cutaia.

Regarding claim 8, Cutaia discloses a method (figure 3) of determining overall lightness contrast of an image comprising:

- 1) extracting pixel values from said image (photodetector 8 extracts pixel values);
- 3) calculating area contrast based on said pixel values (column 10, line 30: B_{JK} is a calculation of the area contrast within the area LA);
- 4) calculating an image range based on said pixel values (column 10, lines 30: the dimensions L and A are calculated as an image range); and

B) calculating said overall lightness contrast of said image by combining: said image range and said area contrast and (column 10, lines 69-70: $B_{JK}(\text{normalized})$ represents an overall contrast measure and is calculated as a combination of the image range LA and the area contrast B_{JK}).

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Regarding claim 13, Cutaia teaches that the overall contrast is a linear combination of the area contrast and image range (column 10, lines 69-70: the contrast B_{JK} (normalized) is calculated as a linear ratio of the area contrast B_{JK} and the image range LA).

Regarding claim 14, Cutaia teaches that the overall contrast is a weighted combination of the image range and area contrast (column 10, lines 69-70: the contrast is calculated as the area contrast B_{JK} divided by the image range LA, so that the contrast measure is essentially the area contrast weighted by the image range).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1, 6, 7, 15, 20-22, 27, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of U.S. Patent 3,737,855 by Cutaia.

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Regarding claims 1, 15, and 22, Lee discloses a method (figure 3) and computer program (figure 1) of determining overall lightness contrast of an image comprising:

1) extracting pixel values from said image (column 3, lines 66+: the central computer digitizes the microscope image to extract pixel values);

2) calculating an image edge contrast based on said pixel values (16, figure 3: the “edges of edges” computation is a measure of contrast at the edges);

3) calculating area contrast based on said pixel values (12, figure 3: morphological operations are used to calculate the contrast of the entire image area, as represented by the edge gradient; furthermore, for claim 15, Lee teaches that the image can be in color, so the area contrast calculation would correspond to a color area contrast; column 3, lines 36-38); and

B) calculating said overall lightness contrast of said image by combining: said edge contrast and said area contrast (column 5, line 61 through column 6, line 7: the image contrast score is defined as the ratio of the accumulated edges of edges intensity (“image edge contrast”) and the accumulated edge intensity (“area contrast”)).

Lee does not disclose calculating image range and relative average lightness based on the pixel values, and then using the range and average lightness in calculating the overall lightness contrast.

Cutaia discloses a character enhancement system (figure 3) that involves generating contrast measurements (“contrast measurement generators”) in order to generate thresholds (“contrast threshold generators”).

In particular, Cutaia discloses computing an image range, or mask area, based on the pixel values (column 10, lines 55-57: “L” and “A” specify an image range).

Cutaia also teaches calculating the relative brightness in the image range as “ B_{KJ} ” (column 10, line 30). This relative brightness B_{KJ} is normalized by the image range (LA) to generate the relative average brightness “ $B_{JK}(\text{normalized})$ ” (column 10, lines 67-70).

Then the relative average brightness ($B_{JK}(\text{normalized})$), which incorporates the image range (LA), is used to calculate an area contrast S_{KJ} (column 10, line 34). The area contrast S_{KJ} is a contrast measure that denotes the average line stroke width in the area shown in figure 7 (see column 11, lines 10-26).

Therefore, Cutaia teaches calculating an area contrast based on an image range and a relative average lightness. The area contrast denotes the average line stroke width, which is a measure of edge intensity.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Lee by Cutaia achieve the claimed invention by calculating an image range and a relative average lightness and calculating the overall lightness contrast based on those two calculations, since Lee discloses calculating edge intensity as a measure of area contrast, and Cutaia discloses that an area contrast measurement that denotes edge intensity is conventionally calculated on the basis of an image range and a relative average brightness.

Regarding claims 6, 20, and 27, the combination of Lee and Cutaia teaches that the overall contrast is a linear combination of the image edge contrast, area contrast, image range, and relative average lightness (i.e. Cutaia's image range "LA" and relative average brightness " $B_{JK}(\text{normalized})$ " are combined linearly to form the area contrast S_{KJ} ; and Lee's calculation of the overall contrast involves linearly combining the area contrast and edge contrast as a ratio).

Regarding claims 7, 21, and 28, the combination of Lee and Cutaia teaches that the overall contrast is a weighted combination of the image edge contrast, area contrast, image range, and relative average lightness (i.e. Cutaia teaches that the area contrast S_{KJ} is weighted by a value "Y" (column 10, line 35), so the overall contrast is a combination that is weighted by the value Y).

7. Claims 2, 16, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of Cutaia and U.S. Patent 6,208,766 by Schweyer et al. ("Schweyer").

Regarding claims 2, 16, and 23, the combination of Lee and Cutaia does not disclose said image edge contrast is calculated in a process comprising: determining a local edge contrast; and assessing a standard deviation around a mean value for said local edge contrast across an entire image to produce said image edge contrast.

Schweyer discloses an image processing system that utilizes an image edge contrast measure. In particular, Schweyer calculates an edge contrast measure (column 4, line 28: "K") by determining a local edge contrast ($f_{(x,y)} - H$); and assessing a standard deviation around a mean value for said local edge contrast across an entire image to produce said image edge

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contrast (i.e. K is a calculation of the standard deviation around the mean value H , and the standard deviation is assessed across the entire image, or for every pixel $f(x,y)$ in the image).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Lee and Cutaia by Schweyer to achieve the claimed invention by utilizing Schweyer's image edge contrast since Schweyer discloses that the claimed process for calculating an image edge contrast is conventional and was well-known in the art at the time of the invention.

8. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of U.S. Patent 6,208,766 by Schweyer et al. ("Schweyer").

Regarding claim 9, Lee does not disclose the claimed process for calculating the image edge contrast. However, it would have been obvious in view of Schweyer to calculate the image edge contrast as claimed, per the reasoning above in paragraph 7.

9. Claims 3, 17, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of Cutaia and U.S. Patent 4,809,349 by Herby et al. ("Herby").

Regarding claims 3, 17, and 24, the combination of Lee and Cutaia does not disclose said area contrast is calculated in a process as claimed.

Herby discloses an image processing system that utilizes an area contrast measure. In particular, Herby calculates the area contrast in a process (column 5, line 46 through column 6, line 6) comprising:

clustering lightness data into lightness areas (column 5, lines 47-56: lightness data for the $j-1$ and $j+1$ lines form two "lightness" areas);

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counting a number of said lightness areas (the $j-1$ and $j+1$ lines form two lightness areas);
determining a mean lightness and a number of pixels in each lightness area (column 5, lines 60-68: MV and MF are the (weighted) average lightness values for the $j+1$ and $j-1$ lines; and there are three pixels in each lightness area);

computing weighting coefficients for each pair of lightness areas (column 5, lines 60-68: weighting coefficients for $j+1$ lightness area is $[s \ 1 \ s]$; weighting coefficients for $j-1$ lightness area is $[f \ 2f \ f]$);

computing weighted differences in mean lightness for each pair of lightness areas (column 6, line 6: $GR(i,j)$ is the weighted difference between the mean values MV and MF);

and determining a sum of said weighted differences to produce said area contrast (column 6, line 6: there is only one weighted difference, and that difference produces the area contrast $GR(i,j)$).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Lee and Cutaia by Herby to achieve the claimed invention by utilizing Herby's area contrast since Herby discloses that the claimed process for calculating an area contrast is conventional and was well-known in the art at the time of the invention.

10. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of U.S. Patent 4,809,349 by Herby et al. ("Herby").

Regarding claim 10, Lee does not disclose the claimed process for calculating the area contrast. However, it would have been obvious in view of Herby to calculate the area contrast as claimed, per the reasoning above in paragraph 9.

11. Claims 4, 18, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of Cutaia and Fundamentals of Electronic Image Processing by Weeks, Jr. (“Weeks”).

Regarding claims 4, 18, and 25, the combination of Lee and Cutaia does not disclose said image range is calculated in a process as claimed.

Weeks discloses the conventional methods of calculating an image contrast (pages 91-93). In particular, Weeks calculates an image range (equation 3.3, page 93) for determining the contrast by:

choosing a maximum lightness value (“ $\text{maximum}[f(x,y)]$ ”) and a minimum lightness value (“ $\text{minimum}[f(x,y)]$ ”);

adding said maximum lightness value and said minimum lightness value to compute a sum (“ $\text{maximum}[f(x,y)] + \text{minimum}[f(x,y)]$ ” in denominator);

subtracting said minimum lightness value from said maximum lightness value to compute a difference (“ $\text{maximum}[f(x,y)] - \text{minimum}[f(x,y)]$ ” in numerator);

and dividing said difference by said sum to produce said image range (i.e. the difference divided by the sum produces the image range).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Lee and Cutaia by Weeks to achieve the claimed invention by utilizing Weeks image range since Weeks discloses that the claimed process for calculating an image range for use in determining an image contrast measure is conventional and was well-known in the art at the time of the invention.

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12. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of U.S. Patent 6,208,766 by Schweyer et al. ("Schweyer").

Regarding claim 11, Lee does not disclose the claimed process for calculating the image range. However, it would have been obvious in view of Weeks to calculate the image range as claimed, per the reasoning above in paragraph 11.

Allowable Subject Matter

13. Claims 5, 12, 19, and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. However, incorporation of claim 12 into claim 8 would not necessarily render claim 8 allowable, since claim 8 does not require the details of claim 12. Neither Lee nor Cutaia discloses or suggest calculating the average relative lightness by computing the first and second absolute value of a difference, as claimed.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 5,524,070 by Shin et al.,

U.S. Patent 6,718,056 by Bothorel et al., and

U.S. Patent 5,210,799 by Rao.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Colin M. LaRose whose telephone number is (703) 306-3489. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au, can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the TC 2600 Customer Service Office whose telephone number is (703) 306-0377.

CML

Group Art Unit 2623

6 August 2004

A handwritten signature in black ink, appearing to read 'Colin M. LaRose', with a stylized, cursive script.